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RESEARCH MEMORANDUM



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THE RELATION BETWEEN DIVIDENDS AND PROFITS

A.L. HEMPENIUS

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THE RELATION BETWEEN DIVIDENDS AND PROFITS

A.L. HEMPENIUS

1. Introduction

There seems to be a so-called "small firm effect" regarding the returns on a firm's common stock: these returns are negatively correlated with the total market value of the firm's securities; see e.g. Barry and Brown (1984). I want to investigate a closely related issue regarding dividend payments.

Although the rationality of dividend payments is a still much debated issue, dividends are being paid and being wished; see Long (1978), Easterbrook (1984) and Shefrin and Statman (1984). I shall investigate whether firms with large profits have a smaller payout ratio than firms with small profits (or, equivalently, a higher ratio of retained earnings to dividends).

On the average, firms with large (total) profits are firms that are large by other standards. One may think of several reasons why (thus defined) large firms possibly retain a higher ratio of their profits than small firms: (i) higher power of management to retain part of "its" firm, combined with the possibility to find more profitable investments; (ii) larger firms possibly accomodate a relatively large portion of the higher income clientele who might prefer less dividends; or simply: (iii) large firms, being the more succesful ones and thus the ones with larger profitable investment opportunities, use their (cheap) retained profits more succesfully than small firms.

If there is no relation between the payout ratio D/P and P (where D denotes total cash dividends and P total profits), then D/P shows only erratic fluctuations around a constant, that might differ by type of firm. If there is a size effect in the sense of large firms having a smaller payout ratio than small firms, then D/P decreases with increasing P : $D/P = f(p)$, with $f'(P) < 0$. Or equivalently: $D = f(P)P \equiv g(P)$, so the question of the size effect may be rephrased by asking whether there are "returns to scale" in the form of the elasticity $g'(P) P/D$ being smaller than 1. The easiest mathematical form for $D = g(P)$ evidently is the constant elasticity form:

$$(1) \quad D = aP^b.$$

For $b = 1$ the payout ratio is a constant and for $b < 1$ the elasticity of dividends with respect to profits is smaller than 1, or put differently, the payout ratio declines with increasing profits.

The size effect may thus be investigated by running cross-sectional regressions for equation (1). This is done for several years. Moreover a pooled time series-cross section approach is used, which thus entails the specification of a time series model consistent with (1). This model is developed in Section 2.

In Section 3 the data used is described. There are two "problems" with the data: (i) they contain profits for corporations using different asset evaluation systems, and (ii) the data is censored, as zero dividends are paid for "low" values of the profit variable. For both the measurement problem and the selectivity problem solutions are developed in Section 3.

Section 4 presents estimation results for relation (1) for separate and pooled cross sections of large Dutch corporations and for the pooled dynamic models of Section 2.

2. The time series model

Some form of lagged adjustment as a description of observed dividend behavior is generally accepted; see Lintner (1956), Fama and Babiak (1968) and Jalilvand and Harris (1984). A lagged adjustment model that is consistent with (1) is the following multiplicative model (the index i denotes firm i and the index t period t):

$$(2) \quad D_{it} = \alpha_i P_{it}^{\beta_i} D_{i,t-1}^{\gamma_i},$$

as the equilibrium value of D_i for a given value of P_i is precisely (1) with

$$(3.a) \quad a = \alpha^{1/(1-\gamma)},$$

$$(3.b) \quad b = \beta/(1-\gamma).$$

One rationalisation for specification (2) is an actual payout ratio being the weighted geometric mean of a target payout ratio α_i^* and a payout ratio resulting from unchanged dividends: $D_{it}/P_{it} = (\alpha_i^*)^{\gamma_i} (D_{i,t-1}/P_{it})^{1-\gamma_i}$,

which specifies the (multiplicative) partial adjustment model with target dividend $\alpha_1^* P_{it}$. Note that, in terms of the coefficients of (2), $\beta_1 + \gamma_1 = 1$. Other assumptions leading to (2) are those of "habit persistence" and of dividends paid from "permanent profits", which assumptions do not imply the restriction $\beta_1 + \gamma_1 = 1$.

3. The data: description, character and model

3.1. Description of the data

The main source of the data used is the publication of the Nederlandse Middenstandsbank: Aandelenanalyses (1983), which gives financial data and analyses of 34 large Dutch industrial and trading firms (mentioned in Appendix 1) over the six year period 1977-1982. Among the 204 profit figures there are 21 losses. A loss in a given period invariably leads to zero dividends in the same period.¹⁾ About the same number of cases, 18, shows no dividend while there is a positive profit. Out of 34 companies there are 21 so-called "regular" companies showing positive dividends and positive profits in all six years.

In Section 3.2 the censored character of the dividend variable and in Section 3.3 the problem of measuring the profit variable is treated.

3.2. The censored character of the dividend variable

Lintner's (1956) well-known lagged adjustment model, which is also mentioned in finance textbooks, see e.g. Levy and Sarnat (1982), handles the phenomenon of zero dividend payments, mentioned in Section 3.1, poorly. This lagged adjustment model is:

$$(4) \quad D_t = \beta_1 + \beta_2 D_{t-1} + \beta_3 P_t \cdot$$

1) There is one curious case in this respect: Océ-van der Grinten in 1981 has a net profit of 30,1 million guilders, reorganization expenses of 38 million of their English participations excluded. Dividend in 1981 is 7,3 million. In their own annual report the company relates this dividend to profit before reorganization expenses.

Inclusion of a substantial fraction of zero and negative profits in the data results in an estimated model with poor forecasting ability because from zero and negative profits no (cash) dividends are paid in practice (which this model cannot predict) and because dividends of regular years are predicted less satisfactory (because of the inclusion of the irregular years).

Lintner (1956) did his testing on aggregate data, for which the problem does not arise, and Fama and Babiak (1968), using firm data, do not mention the problem (possibly because it did not exist).

Maddala (1983, p. 162) suggests a "model of friction" in order to take into account the sticky character of dividends. Although there is a positive probability of zero dividends in his model, the assumption of known limits at which the jumps take place, is not realistic.

A better model may be obtained by using Heckman's (1979) model for a censored variable. Although there is then only one jump in the model's dividend variable, this is hardly serious if one is interested in the behavior of the average firm: there is only one value at which jumps take place for all firms at the same value, that of zero dividends; this is the critical value.

Denoting by x_t the vector of variables influencing potential dividend D_t for period t , potential dividend is assumedly described by:

$$(5) \quad g(D_t) = f_1(x_t) + \epsilon_t,$$

with $g(\)$ a known function and ϵ_t an error term. One observes only zero and positive dividends. The firm concerned decides to pay a positive dividend over period t only if its profit is "large enough", say if

$$(6) \quad P_t > P_t^*,$$

with P_t^* the critical value of profit in period t , i.e. dividend is censored for values of $P_t < P_t^*$. The critical value P_t^* depends on a vector of variables z_t :

$$(7) \quad P_t^* = f_2(z_t) + u_t,$$

with u_t an error term.

The complete dividend decision may then be described as follows:

$$(8a) \quad D_t > 0, \text{ if } P_t > f_2(z_t) + u_t ;$$

$$(8b) \quad D_t = 0, \text{ if } P_t < f_2(z_t) + u_t .$$

For the zero dividend observations one does not observe the potential value of D_t according to the potential dividend function (5). For positive dividend observations it follows from (8a) and (5):

$$(9) \quad E[g(D_t) | D_t > 0] = E[g(D_t) | u_t < P_t - f_2(z_t)] \\ = f_1(x_t) + E[\varepsilon_t | u_t < P_t - f_2(z_t)] .$$

A selectivity problem exists if the last expectation is unequal to zero, which is, for example, the case if the ε_t and u_t have nonzero contemporaneous covariances. (This is so if x_t and z_t both contain the observed value of the same variable with random measurement error.) Heckman (1979) solves this problem by assuming a bivariate normal distribution for (ε_t, u_t) and estimating $E[\varepsilon_t | u_t < P_t - f_2(z_t)]$.

The sluggish character of observed dividend policies suggests the inclusion of lagged observed dividend D_{t-1} , into x_t of (5). It may happen that $D_{t-1} = 0$, when estimating $f_1(\cdot)$ from the potential D-values ($D_t > 0$). An additive specification like (4) can handle such a case. Note that a multiplicative specification cannot. As declaring a zero dividend may be seen as a signal of expectation of difficult times (see Miller and Rock (1985)), one cannot expect that a positive dividend in the next period may be described by a smooth function like (5): only when the firm is on a "regular" course can this be the case. So the most complete description of dividend behavior would use (5) for "regular" years and some other rule for the "irregular" years.

Note that one may force $E[\varepsilon_t | u_t < P_t - f_2(z_t)]$ to near-zero by being still more selective in the sample analyzed, i.e. in such a way that the condition $u_t < P_t - f_2(z_t)$ is nearly nonrestrictive. This is the case for prosperous firms, which will have a large value of $P_t - f_2(z_t)$. Of course, such a selection procedure assumes enough degrees of freedom left, as may be the case in a pooled time series cross section analysis; see also Section 4.

3.3. The measurement problem

Dividend payments are, at least in principle, measured without error: dividend is declared and the amount (per share or in total) is assumedly the same. The measurement process is a very simple one.

In sharp contrast to this "clean" measurement of dividends are the regressor variable profit's measurement difficulties, due to the large number of possibilities in measuring a firm's assets. It will now be assumed that firms use only one of two systems: valuation at historic prices or at current prices. Denote by $A_t^h(T)$ the undepreciated part, in period t , of an individual asset of age T and at historic prices (of period $t-T$). Letting $p(t-j)$ be the price index in period $t-j$ of the asset with respect to the base period $t-T$, the current value, $A_t^r(T)$, of the asset in period t is:

$$(10) \quad A_t^r(T) = A_t^h(T) \prod_{j=1}^T p(t-j) ,$$

where $p(t-T) = 1$. The relation between A^r and A^h may thus be written as:

$$(11) \quad A_t^r(T) = A_t^h(T) (1+\bar{p}_t)^T ,$$

with \bar{p}_t the moving geometric average price increase during the previous T periods, including the current period t :

$$(12) \quad 1+\bar{p}_t = \left\{ \prod_{j=1}^T p(t-j) \right\}^{1/T} .$$

If this moving average remains reasonably stable over some time interval and if the same holds for the mean age T (in fact T_t) for an aggregate of similar assets, then one expects (11) to hold, for this time interval, where A now denotes aggregate assets. As the time interval of the data used is six years, (11) will be assumed to hold.

This still leaves the following question: what is the effect of relation (11) on profits. This question can only be answered very approximately. Assuming profits, before the deduction of depreciation charges, to be proportionate to the value of assets, with differences in depreciation charges according to the valuation system used, one has for measured profits:

$$(13.a) \quad P_t^r = c A_t^r - C_t^r$$

$$(13.b) \quad P_t^h = c A_t^h - C_t^h ,$$

with C denoting depreciation charges. As relation (11) also holds if A is replaced by C , one has the following relation between P^r and P^h :

$$(14) \quad P_t^r = (1 + \bar{p}_t)^T P_t^h .$$

If one assumes (more realistically) profits before depreciation in either case to be proportional to the current value of assets (A^r) then (14) should be replaced by:

$$(15) \quad P_t^r = P_t^h - \{(1 + \bar{p}_t)^T - 1\} C_t^h .$$

Relation (14) fits well into a multiplicative model and it will be assumed to hold approximately, in the sense that:

$$(16) \quad P_{it}^r \approx b P_{it}^h ,$$

with the previously mentioned assumption of $(1 + \bar{p}_t)^T$ being approximately constant over the time interval considered and with the extra assumption of $(1 + \bar{p}_t)^T$ being the same for all firms.

Of course, the probably more realistic expression (15) may also be used, but it is more complicated in the sense that one needs \bar{p}_t and T . It is therefore preferable to use (16) as an approximation of (15). Note that, for time intervals in which current asset prices increase, if (15) is the true relation, one expects $b < 1$, whereas $b > 1$ if (14) would be the true relation. So a rough test of either (14) or (15) may be made through b of (16). Incorporation of (16) into a multiplicative model in which P^h is a regressor, may be done by using a dummy variable for the difference in measured profits due to the valuation system, as follows.

Suppose one wants to estimate the parameters in (2) where P_{it} is the "true" value of profits, i.e. the value according to the valuation system one chooses as the base system. One has measured \tilde{P}_{it} for the profit variable, where

$$(17) \quad \tilde{P}_{it} = b_{it} P_{it}^h$$

connects measured and true value. Suppose one chooses historic valuation as the base system, then $b_{it} = 1$ if firm i uses this system in period t , and $b_{it} = b$ (from equation (16)) if firm i uses the other system. Substituting (17) into (2) gives:

$$(18) \quad D_{it} = \alpha_i (b_{it})^{-\beta} \tilde{P}_{it}^{\beta} D_{i,t-1}^{\gamma} e^{\varepsilon_{it}},$$

where a multiplicative disturbance has been added. One may then use, in the transformed (logarithmic) model (18), a dummy variable to represent the two possible values of $\alpha_i (b_{it})^{-\beta}$, namely α_i and $\alpha_i(b)^{-\beta}$. Note that b is identifiable.

One might be tempted to get rid of the measurement problem (17) by using percentage changes (with respect to the previous period's value) or first differences of logarithms. Assuming $b_{it} = b_i$, the first differences of logarithms transformation (applied to the transformed equation (18)) removes the whole term $\ln \alpha_i + \beta \ln b_i$. As the two transformations mentioned are almost equivalent for not too large percentage changes (say $< 10\%$), attention will be centered on first differences of logarithms. Taking first differences of the logarithmic version of model (18) gives for $b_{it} = b_i$:

$$(19) \quad \Delta \ln D_{it} = \beta \Delta \ln \tilde{P}_{it} + \gamma \ln D_{i,t-1} + \Delta \varepsilon_{it}.$$

One gains degrees of freedom, but evidently this transformation is justified only when the ε_{it} are strongly autocorrelated for each firm i . The danger of introducing autocorrelation is almost always there, because of the inevitable random measurement errors. This may be seen as follows.

In addition to a systematic measurement "error" the profit variable exhibits a random measurement error:

$$(20) \quad \tilde{P}_{it} = b_i P_{it} e^{u_{it}},$$

where $b_i \neq 1$ represents a systematic error and $u_{it} \neq 0$ a random error. Equation (19) then becomes

$$(21) \quad \Delta \ln D_{it} = \beta \Delta \ln \tilde{P}_{it} + \gamma \ln D_{i,t-1} + (\Delta \varepsilon_{it} - \beta \Delta u_{it}).$$

As it is reasonable to assume that the random errors u_{it} are for each i uncorrelated over time, even time-uncorrelated terms $\Delta \epsilon_{it}$ lead to autocorrelation of the term $(\Delta \epsilon_{it} - \beta \Delta u_{it})$ for each firm i .

The conclusion must be that one should hesitate to apply the percentage change or $\Delta \ln$ transformation to the multiplicative model if one suspects considerable random measurement variations: one also transforms the random measurement terms, leading to higher covariances (in time) the higher the variances of the random errors u_{it} are for each i .

The additive error model:

$$(22) \quad \tilde{p}_{it} = (P_{it} + b_{it}) + u_{it}$$

could be combined with an additive regression model to give exactly the same conclusions. Equation (15) gives the following specification for b_{it} if one uses historic valuation as the base system: $-b_{it} = (1 + \bar{p}_t)^T C_t^h - C_t^h = C_t^r - C_t^h$, i.e., the extra depreciation charges because of increasing asset prices, if firm i values at current prices, and b_{it} is zero otherwise.

In the following section the multiplicative combination (18) and (20) is applied to the problem of explaining variations in cash dividend.

4. Estimation results

4.1. Introduction

In Section 4 a further selectivity is imposed on the data for most of the estimations: 21 "regular" firms, i.e. firms having positive dividends and profits in all periods observed, will be used most of the time. This ensures a zero (conditional) expectation of the error term in (9); see Section 3.2. Of course, a price must be paid for this advantage of increasing selectivity: one moves still further away from a random sample, i.e. one possibly introduces nonzero (contemporaneous) covariances.

4.2. Long run behavior of dividends with respect to profits

In this subsection the long run behavior of dividends with respect to profits is investigated with the following assumptions:

- (i) the only long run determinant of cash dividends is profit,
- (ii) cross-sectional behavior reflects long run characteristics of individual firms.

The model thus is, for each sample value of t :

$$(23) \quad \ln D_{it} = \beta_0 + \beta_1 \ln P_{it} + \epsilon_{it}, \quad (i=1, \dots, n) .$$

For the $n = 21$ "regular" companies, used in the next section for analysing short run behavior, the results are stated in Table 1 together with the pooled estimates and the estimates for all company-years for which D_{it} and P_{it} are

TABLE 1: CROSS SECTION RESULTS

		$\hat{\beta}_0$	$s_{\hat{\beta}_0}$	$\hat{\beta}_1$	$s_{\hat{\beta}_1}$	R^2
Regular companies	1977	-0.935	0.228	0.977	0.055	0.949
	1978	-0.866	0.221	0.966	0.054	0.943
	1979	-0.486	0.222	0.870	0.053	0.935
	1980	-0.674	0.212	0.930	0.051	0.947
	1981	-0.195	0.297	0.829	0.071	0.879
	1982	-0.591	0.163	0.926	0.039	0.968
Pooled		-0.620	0.093	0.913	0.022	0.931
All regular company-years		-0.655	0.080	0.915	0.020	0.929

positive.²⁾ The results for the pooled estimation and the estimation with all regular company-years are almost the same. The long run multiplicative model implied by the pooled result of the regular companies is:

$$(24) \quad \hat{D}_t = 0.54 p_t^{0.91}.$$

As to the issue of heteroskedasticity, Figure 1 reveals no evidence of it, for the transformed variables, nor does inspection of the residuals.

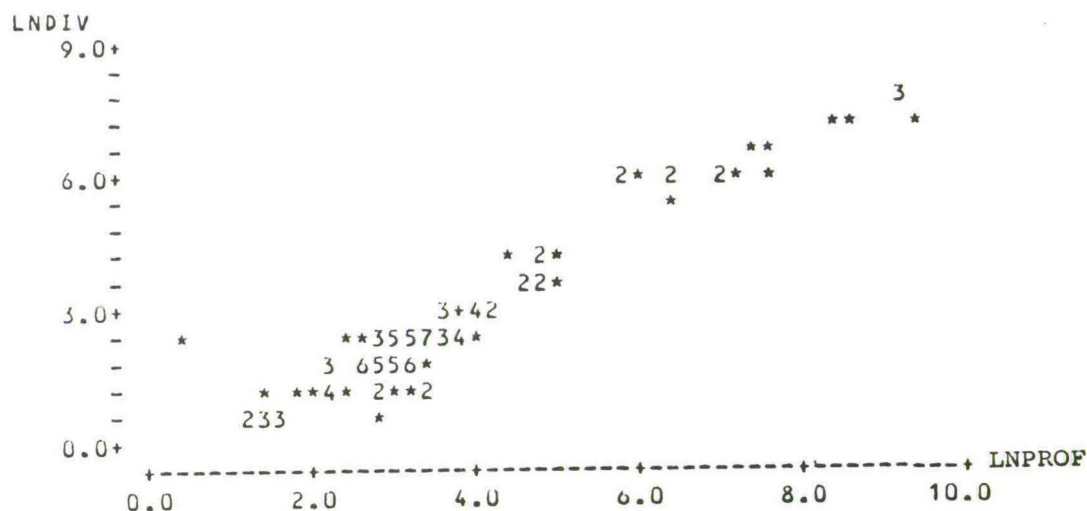


Figure 1

There is quite some variability in the implied constant ($\exp(\hat{\beta}_0)$) of the multiplicative model over the years in Table 1: the range is from 0.4 to 0.8, approximately. The variability in the long run elasticities $\hat{\beta}_1$ is much smaller: they range from 0.87 to 0.98. The (unweighted) averages of the $\hat{\beta}_0$ and $\hat{\beta}_1$ are 0.62 and 0.92, respectively. The pooled estimates of β_0 and β_1 are very close to these values. These pooled estimates may be interpreted as

2) This regression has been done with and without the very large Koninklijke Olie (Royal Dutch Oil), resulting in very small differences in $\hat{\beta}_0$ and $\hat{\beta}_1$; R^2 dropped to 0.893.

matrix weighted averages of the cross-sectional vectors $(\hat{\beta}_0^{(t)}, \beta_1^{(t)})$, as follows.

Define $y = \ln D$ and $x = \ln P$ and write $y_t = X_t b_t + e_t$ ($t=1, \dots, 6$) for the cross-sectional regressions, with y_t and e_t of order $n \times 1$, X_t of order $n \times 2$ and $b_t = (\hat{\beta}_0^{(t)}, \hat{\beta}_1^{(t)})$ of order 2×1 . The pooled regression, assuming an equal number of companies (although this is not essential to the argument), may be written as $y = Xb + e$, with $y' = (y'_1, \dots, y'_6)$, $X' = (X'_1, \dots, X'_6)$, $b = (\hat{\beta}_0, \hat{\beta}_1)$ and $e' = (e'_1, \dots, e'_6)$. One then has:

$$\begin{aligned}
 (25) \quad b &= (X'X)^{-1} X'y \\
 &= \left(\sum_{t=1}^6 X'_t X_t \right)^{-1} \sum_{t=1}^6 X'_t y_t \\
 &= \left(\sum_t X'_t X_t \right)^{-1} \sum_t X'_t X_t b_t \\
 &= \sum_t \left[\left(\sum_s X'_s X_s \right)^{-1} X'_t X_t \right] b_t.
 \end{aligned}$$

The sum of the matrix weights $\left(\sum_s X'_s X_s \right)^{-1} X'_t X_t$ is the unity matrix I of order 2×2 . Evidently the pooled b is a matrix weighted average of the vectors b_1, \dots, b_6 , so that both $\hat{\beta}_0^{(t)}$ and $\hat{\beta}_1^{(t)}$, $t=1, \dots, 6$, influence each of the pooled estimates $\hat{\beta}_0$ and $\hat{\beta}_1$.

Using a dummy d_{it} , which is 1 if company i uses the current value system and 0 if it uses the historical value system, results (for all company-years) in:

$$\begin{aligned}
 (26) \quad \ln D_{it} &= -0.689 + 0.916 \ln P_{it} + 0.082 d_{it} \\
 &\quad (0.085) \quad (0.020) \quad (0.070) \quad R^2 = 0.929
 \end{aligned}$$

There is no significant effect of the valuation system, meaning that in the long run the value b of (16) is approximately 1, or explicitly stated: in the long run profits are measured independently of the valuation system companies use. In the long run the measurement system can hardly be expected to influence profits, as under any system replacements of assets have to be made and at the same prices. In the short run provisions for replacement may be different and thus influence reported profits. As the sample used consists of only six periods, the existence of the measurement effect has been tested.

Another economically significant result is the value of the elasticity of cash dividends with respect to profits: it is somewhat smaller than 1. In 1977 and 1978 the average elasticity is 0.97, but in the four years 1979-1982 it is on the average 0.89. The pooled estimates with their low standard errors show a statistically very significant departure from 1. Another way of stating this result is in terms of the (long run) payout ratio:

$$(27) \quad \frac{D_t}{P_t} = 0.54 P_t^{-0.09},$$

meaning that the payout ratio decreases slightly with increasing profits, or (the same thing) the retention ratio increases slightly with increasing profits.

The reason for a decreasing payout ratio in the long run might be a departure from the adjustment model (in which the short run elasticities of P_t and D_{t-1} sum to 1), as follows. If the short run model is:

$$(28) \quad D_t = \alpha P_t^\beta D_{t-1}^\gamma,$$

then the equilibrium solution may be written as:

$$(29) \quad \frac{D_t}{P_t} = a P_t^b$$

with $a = \alpha^{1/(1-\gamma)}$ and $b = (\beta + \gamma - 1)/(1 - \gamma)$. If $\beta + \gamma < 1$, then $b < 0$. The above result (27) is thus evidence against the multiplicative partial adjustment model. A multiplicative habit persistence model, meaning a dividend policy of rather stable dividend payments, thus might be the (somewhat) more appropriate model.

In this subsection and the next one nominal figures have been used. In Appendix 2 one may find this choice motivated.

4.2. Short run behavior of dividends with respect to profits

In this subsection the short run behavior of dividends with respect to profits is investigated by means of the dynamic model (2). The OLS estimation of (2) with $\alpha_1 = \alpha$, $\beta_1 = \beta$ and $\gamma_1 = \gamma$ results in:

$$(30) \quad \ln D_{1t} = -0.175 + 0.291 \ln P_{1t} + 0.691 \ln D_{1,t-1} \quad R^2 = 0.988$$

(0.046) (0.030) (0.032)

where the sample consists of the 21 "regular" persistently profit making and dividend declaring corporations. The reason for using this sample follows from the fact that the correctly formulated model is (2) with $D_{it} > 0$, i.e. with the complication described in (8). By using these "regular" firms one avoids the problem of estimating $E(\epsilon_t | u_t < P_t - f_2(z_t))$ in (9), and also the inability of (2) to cope with $D_{t-1} = 0$. As mentioned in Section 3.2 the model for potential dividends (2) is only useful for the regular years, so this inability does not restrict its use.

The estimated covariance of the estimated coefficients of $\ln P_{it}$ and $\ln D_{i,t-1}$ is -0.0048 from which one may compute a t-ratio of -0,7 for testing $\beta + \gamma = 1$. Evidently the partial adjustment model cannot be rejected.

As $R^2 = 0.988$ in (30) it is very difficult to improve on this result by adding terms, like dummy variables which differentiate the constant term and/or the elasticities. Besides the previous dummy variable for distinguishing between valuation systems another dummy has been used to distinguish between national and multinational companies (AKZO, Philips, Unilever and Royal Dutch Oil). As may be predicted, no significant additions to the estimated model (30) were found in this way.

In order to take random measurement errors in $\ln P_{it}$ into account, specification (2) has also been estimated by the instrumental variables (IV) technique. Two instruments for $\ln P_{it}$ have been tried: the (natural) logarithms of the balance sheet total and of cash flow.³⁾ See Table 2 for the results.

Table 2: IV-RESULTS FOR (2)*

Instrumental variable	Constant	$\ln P_{it}$	$\ln D_{i,t-1}$	R^2
Balance sheet total	-1.004 (0.71)	1.133 (0.79)	-0.150 (-0.10)	0.891
Cash flow	-0.196 (-3.13)	0.312 (5.97)	0.670 (12.54)	0.988

* Between parentheses t-ratio's are stated.

3) The simple correlations with $\ln P_{it}$ are, respectively: 0.896 and 0.957. The correlations with the residuals of (30) are, of course, low: 0.061 and 0.009.

As cash flow seems less subject to measurement errors, and as it is highly correlated with profits, its use as IV seems evident. The results of using cash flow as IV are approximately the same as the OLS-results in (30).

The result in (30) may again be interpreted as a matrix weighted average, but now of company regressions over the years. In obvious notation: the vector b of estimated coefficients in (30) may be written as:

$$(31) \quad b = \sum_{i=1}^n [(\sum_{j=1}^n X_i^{*'} X_i^{*})^{-1} X_i^{*'} X_i^{*}] b_i^{*}$$

where the stars denote company regressions.

One final remark: theoretically the random effects model is not unattractive (if all systematic variations in the α_i have already been accounted for). There is, however, no room for another parameter in addition to the result (30).

Concluding, from (30): the short run elasticity of dividends with respect to profits is rather low. The long run elasticity is approximately 1, which does not contradict the average cross-section results of Section 4.1, because the estimated long run elasticity calculated from (30) is 0.94 and very small changes in the estimated coefficients in (30) produce a value smaller than 0.9. The differences in measurement systems are not detectable.

REFERENCES

1. Barry, Christopher B. and Stephen J. Brown, "Differential information and the small firm effect", Journal of Financial Economics 13 (1984), 283-294.
2. Easterbrook, Frank H., "Two agency-cost explanations of dividends", American Economic Review 74 (1984), 650-659.
3. Fama, Eugene F. and Harvey Babiak, "Dividend policy: an empirical analysis", Journal American Statistical Association 63 (1968), 1132-1161.
4. Levy, Haim and Marshal Sarnat, Capital investment and financial decisions (1982), Prentice-Hall.
5. Heckman, James J., "Sample selection bias as a specification error", Econometrica 47 (1979), 153-161.
6. Jalilvand, Abolhassan and Robert S. Harris, "Corporate behavior in adjusting to capital structure and dividends targets: an econometric study", Journal of Finance 39 (1984), 127-145.
7. Lintner, John, "Distribution of incomes of corporations among dividends, retained earnings, and taxes", American Economic Review (1956), 97-113.
8. Long, John B., "The market valuation of cash dividends: a case to consider", Journal of Financial Economics 6 (1978), 235-264.
9. Maddala, G.S., Limited-dependent and qualitative variables in econometrics (1983), Cambridge University Press.
10. Miller, Merton H. and Kevin Rock, "Dividend policy under asymmetric information", Journal of Finance 40 (1985), 1031-1051.

11. Nederlandse Middenstandsbank, Aandelenanalyses (1983).
12. Shefrin. Hersh M. and Meir Statman, "Explaining investor preference for cash dividends", Journal of Financial Economics 13 (1984), 253-282.

APPENDIX 1

This appendix contains the sample of firms studied, in alphabetical order, with the number in brackets indicating the rank (according to sales in 1982) among the top 100 companies on the Amsterdam stock exchange.

- 1 ACF Holding (50)
- Ahold (5)
- AKZO (4)
- Bols (41)
- 5 Borsumij Wehry (30)
- Bührmann-Tetterode (16)
- Caland*
- Ceteco (40)
- CSM (34)
- 10 Deli-Maatschappij (21)
- Desseaux (70)
- Elsevier-NDU (28)
- Fokker (26)
- Gamma (44)
- 15 Gist-Brocades (24)
- Heineken (9)
- Internatio-Müller (15)
- KLM (7)
- Kluwer (38)
- 20 Koninklijke Olie (1)
- KNP (31)
- Meneba (29)
- Naarden International (52)
- Nedlloyd Groep (8)
- 25 Nutricia (47)
- Océ van der Grinten (22)
- Ommeren (35)
- Pakhoed (39)
- Philips (3)
- 30 Telegraaf (51)
- Unilever (2)
- VMF-Stork (20)
- VNU (27)
- 34 Wessanen (13)

* Not among the top 100.

APPENDIX 2

If there would be no money illusion the relations would be between real variables. Denoting the consumer price index by PI the following long run relation would hold (for constant α_t and β_t):

$$(1) \quad \frac{D_{it}}{PI_t} = \alpha \frac{P_{it}}{PI_t}^\beta,$$

so that in

$$(2) \quad D_{it} = \alpha P_{it}^\beta PI_t^\gamma$$

one would test whether $\beta + \gamma = 1$ (no money illusion).

The result, to be compared with the pooled result in Table 1, is for the 21 regular companies:

$$(3) \quad \ln D_{it} = -4.21 + 0.912 \ln P_{it} + 0.784 \ln PI_t$$

(1.95)	(0.022)	(0.424)
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with t-ratio's: -2.16 41.21 1.85

The estimated coefficient of $\ln P_{it}$ is the same as in Table 1, where no regressor PI_t has been used. (Although $\ln PI_t$ is hardly significant (and thus could be eliminated as regressor), one might want to test whether the hypothesis $\beta + \gamma > 1$ could be accepted. With a t-ratio of 1.6 this is not the case.)

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